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PATENT ABSTRACTS OF JAPAN

(11)Publication number :   06-332398

(43)Date of publication of application : 02.12.1994

(51)Int.Cl.

G09G   3/20
G02F   1/133
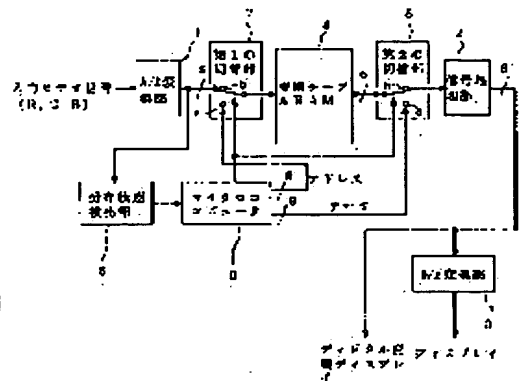G09G   5/00
G09G   5/06
H04N   5/66

(21)Application number : 05-140078

(22)Date of filing :   19.05.1993

(71)Applicant :   FUJITSU GENERAL LTD

(72)Inventor :   YOSHIDA YOSHIO

(54) METHOD FOR PROCESSING VIDEO SIGNAL AND DEVICE THEREFOR

(57)Abstract:

PURPOSE: To improve picture quality by contrasting an image when the image is displayed on a display of an LCD and a PDP, etc.
CONSTITUTION: In a video signal processing device digital-converting an input video signal (RGB primary colors video signals) by an A/D conversion part 1 and thereafter performing prescribed signal process containing gamma correction by a signal processing part 2, and displaying the image on the display with a prescribed number of gradations by the signal processed signal, the digital converted signal is inputted to a distribution condition detection part 5 and the distribution condition of the input video signal is detected at every gradation area divided into a prescribed number, and the area with a prescribed reference value or below among the distribution conditions of respective gradation areas is decided, and the decided result is inputted to a micro computer 6 to rewrite the conversion data in a conversion table RAM 4, and the data in the conversion table RAM 4 are read out by a digital signal to obtain the digital signal with the number of bits required for the number of gradation of the display, and the digital signal is processed by a prescribed method in the signal processing part 2.

LEGAL STATUS

[Date of request for examination]

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[Date of final disposal for application]

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(21)出願番号：	特願平05-140078	(71)出願人：	株式会社富士通ゼネラル
(22)出願日：	1993年05月19日	(72)発明者：	吉田 佳夫

(54) 映像信号処理方法およびその装置

(57)【要約】

【目的】LCDやPDP等のディスプレイに画像を表示する際、画像のコントラストをとり、画質の向上を図る。

【構成】入力映像信号（RGB原色ビデオ信号）をA／D変換部1でディジタル変換した後に、信号処理部2でガンマ補正を含む所定の信号処理を施し、この信号処理した信号によって画像を所定階調数のディスプレイに表示する映像信号処理装置において、ディジタル変換した信号を分布状態検出部5に入力して入力映像信号の分布状態を所定に分割した階調領域毎に検出し、各階調領域の分布状態のうちの所定基準値以下の領域を判定し、この判定結果をマイクロコンピュータ6に入力して変換テーブルRAM4の変換データを書き換え、上記ディジタル信号により同変換テーブルRAM4のデータを読み出して上記ディスプレイの階調数に必要なビット数のディジタル信号を得、このディジタル信号を信号処理部2で所定に処理可能とする。
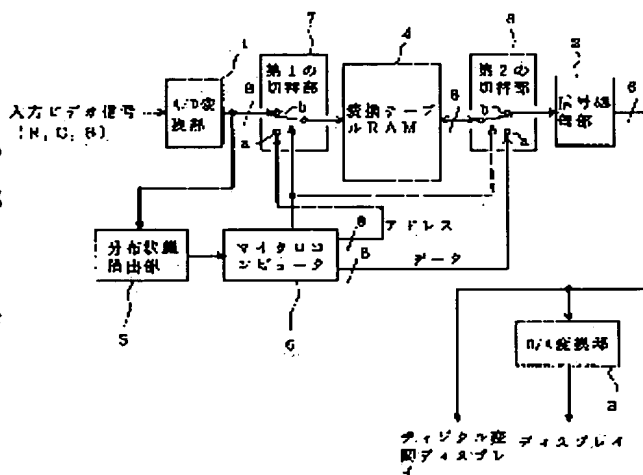
リーガルステータス

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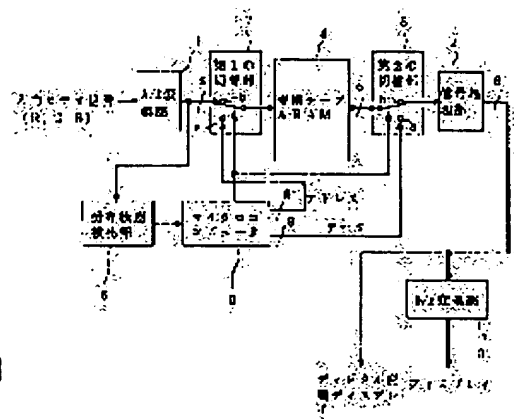
(22)Date of filing :　　　　19.05.1993　　　(72)Inventor :　YOSHIDA YOSHIO

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PURPOSE: To improve picture quality by contrasting an image when the image is displayed on a display of an LCD and a PDP, etc.

CONSTITUTION: In a video signal processing device digital-converting an input video signal (RGB primary colors video signals) by an A/D conversion part 1 and thereafter performing prescribed signal process containing gamma correction by a signal processing part 2, and displaying the image on the display with a prescribed number of gradations by the signal processed signal, the digital converted signal is inputted to a distribution condition detection part 5 and the distribution condition of the input video signal is detected at every gradation area divided into a prescribed number, and the area with a prescribed reference value or below among the distribution conditions of respective gradation areas is decided, and the decided result is inputted to a micro computer 6 to rewrite the conversion data in a conversion table RAM 4, and the data in the conversion table RAM 4 are read out by a digital signal to obtain the digital signal with the number of bits required for the number of gradation of the display, and the digital signal is processed by a prescribed method in the signal processing part 2.

CLAIMS

[Claim(s)]
[Claim 1] After carrying out digital conversion of the input video signal (RGB primary color video signal), predetermined signal processing is performed. When a picture is displayed on the display of the number of predetermined gradation with this signal that carried out signal processing, The video-signal art which detects the distribution state of the aforementioned input video signal, and is characterized by changing the signal corresponding to the field which is over the predetermined reference value among the this detected distribution states which carried out [aforementioned] digital conversion into the number of bits required for the number of gradation of the aforementioned display.

[Claim 2] After carrying out digital conversion of the input video signal (RGB primary color video signal), predetermined signal processing is performed. When a picture is displayed on the display of the number of predetermined gradation with this signal that carried out signal processing, The signal (digital signal) which carried out [aforementioned] digital conversion detects the distribution state of the aforementioned input video signal for every predetermined gradation field. The video-signal art characterized by rewriting the conversion data of translation table memory according to the number of distributions of each detected this gradation field, and changing the aforementioned digital signal into the number of bits required for the number of gradation of the aforementioned display by this translation table memory.

[Claim 3] The video-signal processor which enables the display of a picture on the few display of the number of gradation with the signal which performed and carried out this signal processing of the predetermined signal processing after carrying out digital conversion of the input video signal (RGB primary color video signal) which is equipped with the following and characterized by making it change into the number of bits which doubled the aforementioned digital signal with the number of gradation of a display with the translation table storage means. A translation table storage means to memorize the conversion data which change into the data of the number of bits required for the number of gradation of the aforementioned display the number of bits which constitutes the signal (digital signal) which carried out [aforementioned] digital conversion. A distribution state detection means to judge whether the number of distributions of each gradation field is below a predetermined reference value while the aforementioned digital signal detects the distribution state of the aforementioned input video signal for every predetermined gradation field. Control means which output these calculation conversion data and the address while computing the conversion data of the aforementioned translation table storage means according to the judgment of the number of distributions of each gradation field by this distribution state detection means. The 1st change means which changes the aforementioned digital signal and the address, and the 2nd change means which reads with the write-in data of the aforementioned translation table storage means, and changes data.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention relates to the video-signal processing in electronic displays (LCD (liquid crystal display), PDP (plasma display), etc.), and display technology, and relates to the video-signal processor which makes fitness the picture especially displayed on the detailed few display of the number of gradation, and its equipment
[0002]
[Description of the Prior Art] When carrying out predetermined signal processing and displaying a picture on a display after carrying out digital conversion of the input video signal (for example, television signal), when there is few gradation of a display as [for example,] 64 gradation (6 bits), 6 bits of the 8-bit high order may be used to 8 bits (256 gradation) of the number of bits of the signal which carried out digital conversion, for example, A/D conversion.
[0003] When removing 2 bits of low ranks of this 8-bit data that carried out A/D conversion and considering as 6 bits, the video-signal processor concerned has composition shown in <u>drawing 7</u> . In this drawing, digital conversion of the input video signal (RGB primary color video signal shown in <u>drawing 7</u>) is carried out in the A/D-conversion section 1 at 8-bit data. The 6-bit data which removed 2 bits of low ranks of this 8-bit data are processed to predetermined in the signal-processing section 2 (processing of a gamma correction etc.). Analogue conversion of this 6-bit data that carried out signal processing is carried out in the D/A-conversion section 3, the display concerned is driven with this signal that carried out analogue conversion, and the picture by the input video signal is displayed.
[0004]
[Problem(s) to be Solved by the Invention] However, if it is in the above-mentioned video-signal processor, in order that a dynamic range with APL substantial about a low thing may decrease like a video signal, if a display image becomes a thing without contrast, especially a dynamic range is in small PDP (PDP with few gradation), there is a trouble of becoming the picture which does not have contrast increasingly.
[0005] This invention is made in view of the above-mentioned technical problem, the purpose can take the contrast of a display image, and it is in offering the video-signal art which enabled it to aim at improvement in quality of image, and its equipment.
[0006]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, the video-signal art of this invention, and its equipment After carrying out digital conversion of the input video signal (RGB primary color video signal), predetermined signal processing is performed. When a picture is displayed on the display of the number of predetermined gradation with this signal that carried out signal processing, The distribution state of the aforementioned input video signal is detected, and let it be a summary to have changed the signal corresponding to the field which is over the predetermined reference value among the this detected distribution states which carried out [aforementioned] digital conversion into the number of bits required for the number of gradation of the aforementioned display.
[0007]
[Function] According to this composition, when the above-mentioned distribution state (the number of distributions) is below a reference value, the signal corresponding to a gradation field is removed among the signals which carried out [above-mentioned] digital conversion by the number of isomerism cloths, and this removed signal is changed into the number of bits required for the number of gradation of the above-mentioned display.
[0008] For example, when there is few gradation of the black field of the display image by the input video signal, the signal corresponding to the gradation field of the number of isomerism cloths is removed among the signals which carried out [above-mentioned] digital conversion, and this removed digital signal, i.e., a digital signal with many gradation, is changed into the number of bits required for the number of gradation of the above-mentioned display. Therefore, the contrast of the picture (image)

displayed on a display can be taken, and quality of image improves.
[0009]
[Example] The video-signal art of this invention, and its equipment After carrying out digital conversion (A/D conversion) of the input video signal (RGB primary color video signal), predetermined signal processing (gamma correction etc.) is performed. When a picture is displayed on the display of the number of predetermined gradation with this signal that carried out signal processing, the inside of the signal (digital signal) which carried out [above-mentioned] digital conversion when it detected for every gradation field which divided the distribution state of an input video signal into predetermined and there was a field below the predetermined reference value of the distribution states of each gradation field -- the said place -- a law, while removing the field below a reference value This removed digital signal is changed into the number of bits required for the number of gradation of the above-mentioned display.
[0010] As shown in drawing 1 , therefore, this video-signal processor Translation table RAM4 which changes the signal (digital signal) which carried out digital conversion (A/D conversion) of the input video signal into the number of bits doubled with the number of gradation of a display, The distribution state detecting element 5 which detects the distribution state of an input video signal, and the microcomputer 6 for rewriting the conversion data of translation table RAM4 according to this detected distribution state, It has the 1st change section 7 which changes the above-mentioned digital signal and the address signal outputted from a microcomputer 6, and the 2nd change section 8 which reads with the rewriting data of translation table RAM4, and changes data. In addition, among drawing, the same sign is given to the same portion as drawing 7 , and duplication explanation is omitted.
[0011] Moreover, above-mentioned translation table RAM4 changes into the number of 64 gradation of a display (6 bits) the 8-bit digital signal changed in the A/D-conversion section 1. It judges whether the above-mentioned distribution state detecting element 5 was detected for every gradation field which divided the distribution state of this input video signal into predetermined with the 8-bit signal which carried out A/D conversion, and the number of distributions of a **** gradation field is over the predetermined reference value. The above-mentioned microcomputer 6 generates the address for writing these conversion data in translation table RAM4, and outputs the change signal of the 1st and 2nd change sections 7 and 8 while it computes conversion data according to the detected distribution state.
[0012] Next, if operation of the above-mentioned video-signal processor and an operation of a video-signal art are explained in detail with reference to the graphical representation of drawing 2 or drawing 6 , the picture by the input video signal (RGB primary color video signal) first shown in drawing 2 shall be displayed on the display (LCD and PDP) of the number of gradation (64 gradation; 6 bits) etc.
[0013] As usual, A/D conversion of the input video signal is carried out to the 8-bit digital signal in the A/D-conversion section 1, and this 8-bit digital signal is inputted into the distribution state detecting element 5.
[0014] In the above-mentioned distribution state detecting element 5, as shown in drawing 3 , 255 gradation is quadrisected into 0, 63 and 64, 127 and 128, 191 and 192, or a 255 gradation field, it judges whether the number of distributions of each gradation field is over the predetermined reference value, and the distribution state of an input video signal is detected.
[0015] The above-mentioned microcomputer 6 computes the conversion data which rewrite translation table RAM4 according to the detecting-element cloth state by the distribution state detecting element 5. For example, when the number of distributions of 0 or 63 gradation field is not over the reference value, the conversion data (shown in drawing 4) which change the data of 64 or 255 into 64 gradation among the input digital signals of translation table RAM4 are computed.
[0016] Moreover, when the number of distributions of 192 or a 255 gradation field is not over the reference value, the conversion data (shown in drawing 5) which change the data of 0 or 191 into 64 gradation among input digital signals are computed.
[0017] Furthermore, when neither of number of distributions of 0 or 63 gradation field and 192, or a 255 gradation field is over the reference value, the conversion data (shown in drawing 6) which change the data of 64 or 191 into 64 gradation among input digital signals are computed.

[0018] In addition, although the number of distributions of 64 or a 127 gradation field and 128, or a 191 gradation field is not judged in this example, it is rare for the number of distributions to be below a predetermined reference value in a display image usual in this, and is because a white portion and near a black portion pose a problem. Moreover, when the number of distributions of 0 or 63 gradation field and 192, or a 255 gradation field is over the reference value, the conversion data which compute the conversion data which change the data of 0 or 255 gradation into 64 gradation among input digital signals, for example, are made into 6 bits of high orders among 8 bits of an input digital signal are computed.

[0019] Then, a microcomputer 6 outputs the address and conversion data of translation table RAM4, after outputting the change signal which changes the 1st and 2nd change sections 7 and 8 to Terminal a side in order to write the conversion data which carried out [above-mentioned] calculation in a translation table 4. An end of the writing of this translation table RAM4 outputs the change signal which changes the 1st and 2nd change sections 7 and 8 to Terminal b side.

[0020] The number conversion of gradation doubled with 64 gradation (6 bits) of a display to the 8-bit digital signal of an input video signal is performed by this, and required signal processing, such as a gamma correction, is performed to this changed digital signal in the signal-processing section 2 as usual.

[0021] Thus, in case it changes in order to double with the number of gradation of the display concerned the digital signal which carried out A/D conversion of the input video signal, like the conventional example, a lower bit was not removed but the input digital signal is doubled with the number of gradation of a display with the conversion data according to the distribution state of an input video signal.
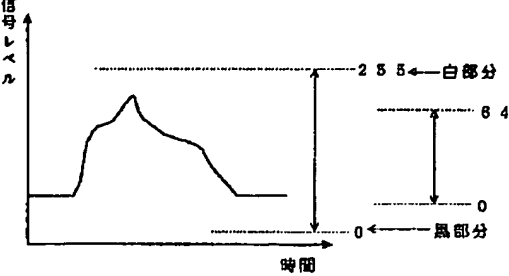
[0022] Therefore, when [for example,] there are few distributions of a black field (0 or 63 gradation field), That is, when there is little gradation information on a display image, it can change into the number of bits which doubled the digital signal of a portion with many gradation with the number of gradation of a display except for the portion. Moreover, when there are few distributions of a white field (192 or 255 gradation field) (i.e., when there is little gradation information on a display image), it can change into the number of bits which doubled the digital signal of a portion with many gradation with the number of gradation of a display except for the portion. Consequently, an effect is large, if contrast can be taken, as a result improvement in quality of image can be aimed at and especially a dynamic range is in small PDP etc., when displaying a picture on the display of the few number of gradation.
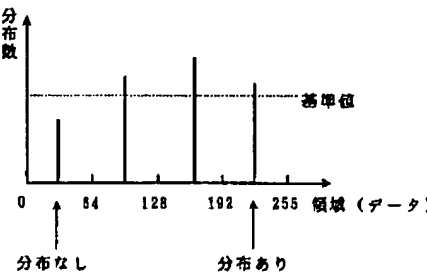
[0023]
[Effect of the Invention] As explained above, according to the video-signal art of this invention, and its equipment After carrying out digital conversion of the input video signal (RGB primary color video signal), predetermined signal processing is performed. When a picture is displayed on the display of the number of predetermined gradation with this signal that carried out signal processing, the inside of the signal (digital signal) which carried out [above-mentioned] digital conversion when it detected for every gradation field which divided the distribution state of an input video signal into predetermined and there was a field below the predetermined reference value of the distribution states of each gradation field -- the said place -- a law, while removing the field below a reference value Since this removed digital signal was changed into the number of bits required for the number of gradation of the above-mentioned display Since a picture (image) is displayed based on a signal with much information on the number of gradation among input video signals, when displaying a picture on the display of the number of gradation, contrast can be taken, as a result improvement in quality of image can be aimed at.
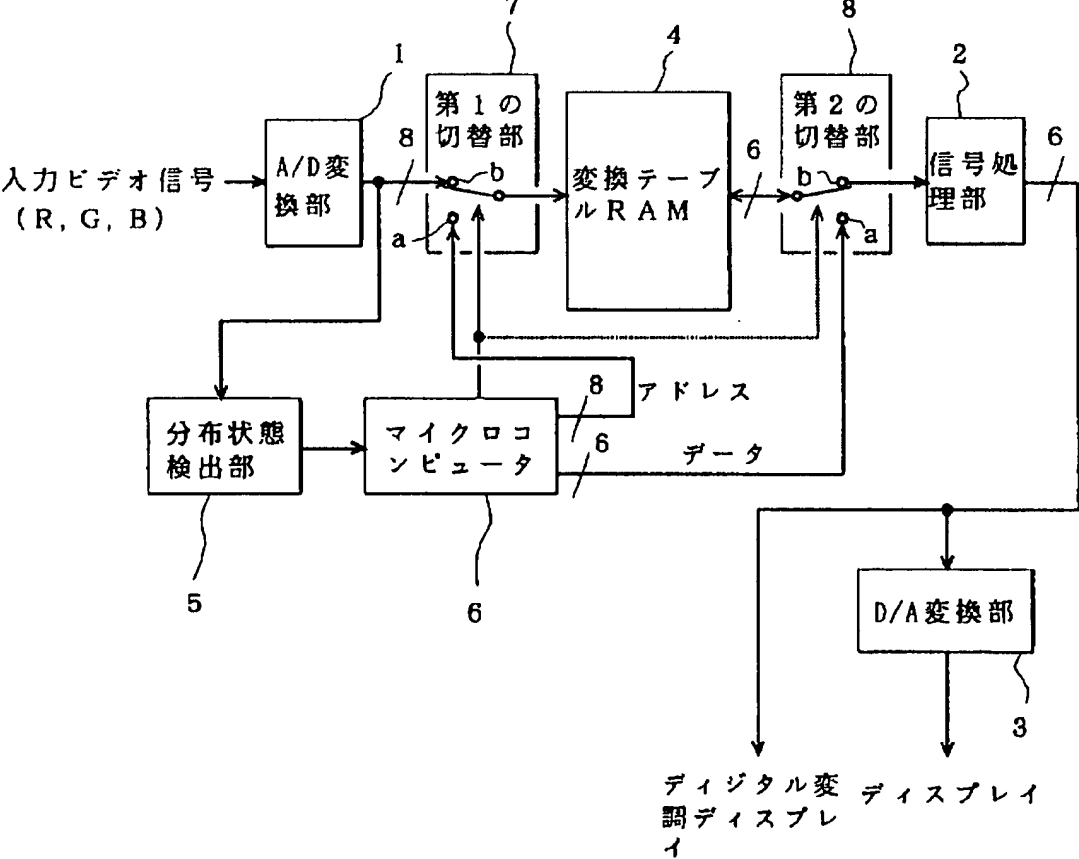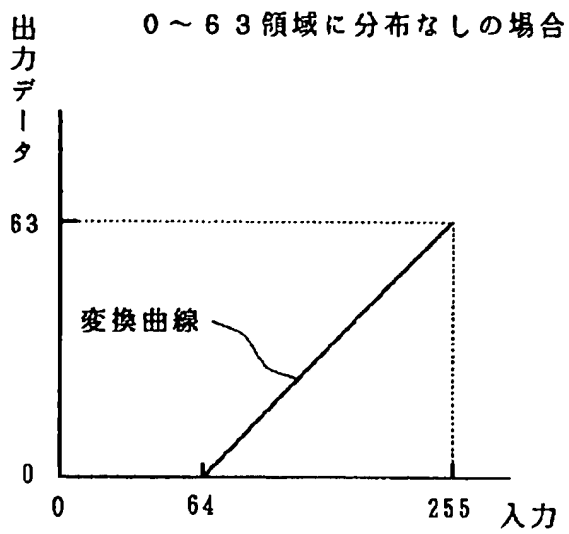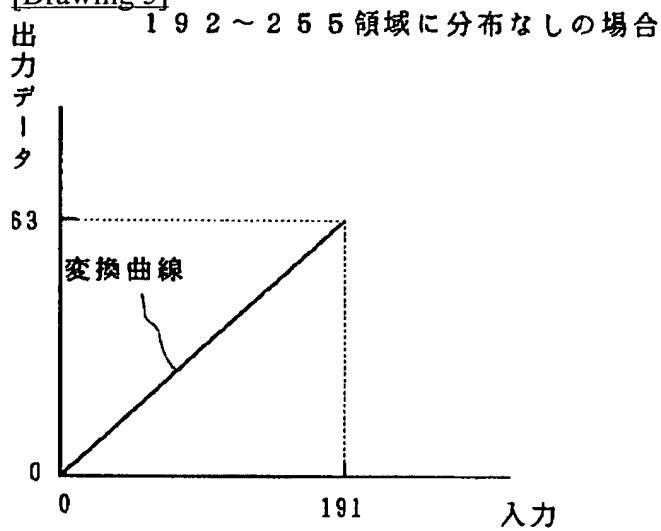
DRAWINGS

[Drawing 2]

信号レベル（縦軸）
時間

255 ←白部分
64
0
0 ←黒部分

[Drawing 3]

分布数
基準値
0　64　128　192　255　領域（データ）
分布なし　　　分布あり

[Drawing 1]

入力ビデオ信号
（R，G，B）

A/D変換部 1
第1の切替部 7
変換テーブルRAM 4
第2の切替部 8
信号処理部 2

8　b　a
6　b　a
6

分布状態検出部 5
マイクロコンピュータ 6
アドレス 8
データ 6

D/A変換部 3

ディジタル変調ディスプレイ
ディスプレイ

[Drawing 4]

０～６３領域に分布なしの場合

出力データ

６３

変換曲線

0

0 64 255 入力

[Drawing 5]

１９２～２５５領域に分布なしの場合

出力データ

６３

変換曲線

0

0 191 入力

[Drawing 6]

０～６３および192～255領域に分布なしの場合

出力データ

６３

変換曲線

0

0 64 255 入力

[Drawing 7]

入力ビデオ信号 → A/D変換部 — 上位6ビット → 信号処理部 — 6

1

2

D/A変換部

3

ディジタル変調ディスプレイ　ディスプレイ

[Translation done.]